9624 • 9625
DUAL CCSL, MOS INTERFACE ELEMENTS
FAIRCHILD INTEGRATED CIRCUITS

GENERAL DESCRIPTION — The 9624 is a dual two-input CCSL compatible interface gate specifically designed to drive MOS. The output swing is adjustable and will allow it to be used as a data driver, clock driver or discrete MOS driver. It has an active output for driving medium capacitive loads.

The 9625 is a dual MOS to CCSL level converter. It is designed to convert standard negative MOS logic levels to CCSL levels. The 9625 features a high input impedance which allows preservation of the driving MOS logic level.

Both the 9624 and 9625 are available in the 14-pin ceramic Dual In-Line package and the ¼ x ¼ Flat Pak.

FEATURES

- **CCSL COMPATIBLE INPUTS/OUTPUT**
- **MOS COMPATIBLE OUTPUT/INPUTS**
- **LOW POWER**

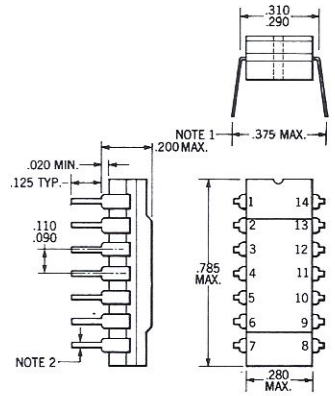
ABSOLUTE MAXIMUM RATINGS (above which the useful life may be impaired)

Storage Temperature	−65°C to +150°C
Temperature (Ambient) Under Bias	−55°C to +125°C
V_{CC} Pin Potential to Ground Pin	V_{DD} to +10 V
Voltage Applied to Outputs for high output state (9624)	V_{DD} to $+V_{CC}$ value
Voltage Applied to Outputs for high output state (9625)	−0.5 V to V_{CC} value
Input Voltage (D.C.) (9624)	−0.5 V to +5.5 V
Input Voltage (D.C.) (9625)	V_{CC} to V_{DD}
V_{DD} Pin Potential to Ground Pin	−30 V to +0.5 V
V_{DD} Pin Potential to Tap Pin (9624)	−30 V to +0.5 V

ORDER INFORMATION

Specify U6A9624XXX and U6A9625XXX for 14-pin TO-116 Dual In-Line package or U3I9624XXX and U3I9625XXX for 14-pin Flat Package where XXX is 51X for the −55°C to +125°C temperature range, or 59X for the 0°C to +75°C temperature range.

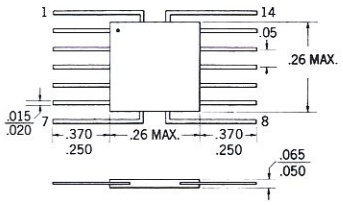
TYPICAL DUAL IN-LINE PACKAGE
In Accordance With
JEDEC (TO-116) Outline



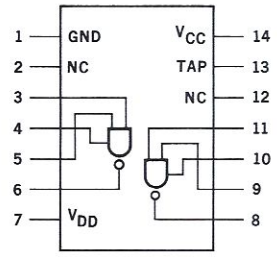
NOTES:
1. Leads are intended for insertion in hole rows on .300" centers. They are purposely shipped with "positive" (.375) misalignment to facilitate insertion.
2. Board-drilling dimensions should equal your practice for a conventional .020 inch diameter lead.

14-PIN FLAT PACKAGE

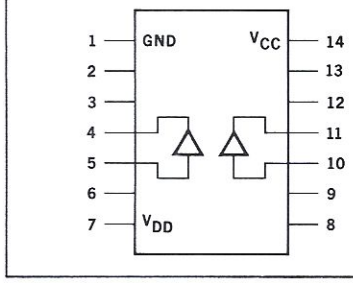
TOP VIEW



9624



9625



313 FAIRCHILD DRIVE, MOUNTAIN VIEW, CALIFORNIA, (415) 962-5011, TWX: 910-379-6435

FAIRCHILD SEMICONDUCTOR
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TABLE I —
ELECTRICAL CHARACTERISTICS ($T_A = -55°C$ to $+125°C$, $V_{CC} = 5.0\ V \pm 10\%$)

SYMBOL	CHARACTERISTICS	LIMITS						UNITS	CONDITIONS
		−55°C		+25°C			+125°C		
		MIN.	MAX.	MIN.	TYP.	MAX.	MIN. MAX.		
V_{OH1}	Output High Voltage	−1.0		−1.0	−0.5		−1.0	Volts	$V_{CC} = 4.5\ V$, $V_{DD} = -28\ V$, $V_{TAP} = 0\ V$ $I_{OH} = -10\ \mu A$
V_{OH2}	Output High Voltage	+3.5		+3.5	+4.0		+3.5		$V_{CC} = 5.5\ V$, $V_{DD} = -20\ V$, $V_{TAP} = 5.5\ V$ Inputs at threshold voltages (V_{IL}) $I_{OH} = -10\ \mu A$
V_{OL}	Output Low Voltage			See Note 1				Volts	$V_{CC} = 4.5\ V$, $I_{OL} = 10\ mA$, $V_{DD} = -11$ to $-28\ V$ @ V_{IH}, $0 \leq V_{TAP} \leq V_{CC}$
V_{IH}	Input High Voltage	2.1		1.9			1.7	Volts	Guaranteed input high threshold for all inputs
V_{IL}	Input Low Voltage		1.4			1.1	0.8	Volts	Guaranteed input low threshold for all inputs
I_F	Input Load Current		−1.40			−1.25	−1.13	mA	$V_{CC} = 5.5\ V$, $V_F = 0.4\ V$ $V_{DD} = -11$ to $-28\ V$
I_R	Input Leakage Current		2.0			2.0	5.0	μA	$V_{CC} = 5.5\ V$, $V_R = 4.0\ V$ $V_{DD} = -11$ to $-28\ V$
I_{CEX}	Output Leakage Current					50		μA	$V_{CC} = 5.5\ V$, $V_{TAP} = 0\ V$ $V_{DD} = -28\ V$, $V_{OUT} = 0\ V$
I_{SC}	Output Short Circuit Current	−12	−31	−14		−32	−11 −28	mA	$V_{CC} = 4.5\ V$, $V_{TAP} = 0\ V$, $V_{IN} = 0\ V$ $V_{DD} = -11\ V$, $V_{OUT} = -11\ V$
I_{VCC}	V_{CC} Supply Current					6.1		mA	$V_{CC} = 5.5V$, $V_{DD} = -15\ V$, $V_{TAP} = 0\ V$ Inputs Open
I_{MAX}	Max. Current					10		mA	$V_{CC} = 10\ V$, $V_{DD} = -30\ V$, Inputs Open $V_{TAP} = 0\ V$
t_{pd+}	Switching Speed				190	250		ns	$V_{CC} = 5.0\ V$, See Figure 2
t_{pd-}	Switching Speed				50	100		ns	$V_{DD} = -13\ V$, $V_{TAP} = 0\ V$

Note 1: Max = V_{DD} +1.0 V over Temperature Range
Typ = V_{DD} +0.2 V over Temperature Range

SCHEMATIC DIAGRAM

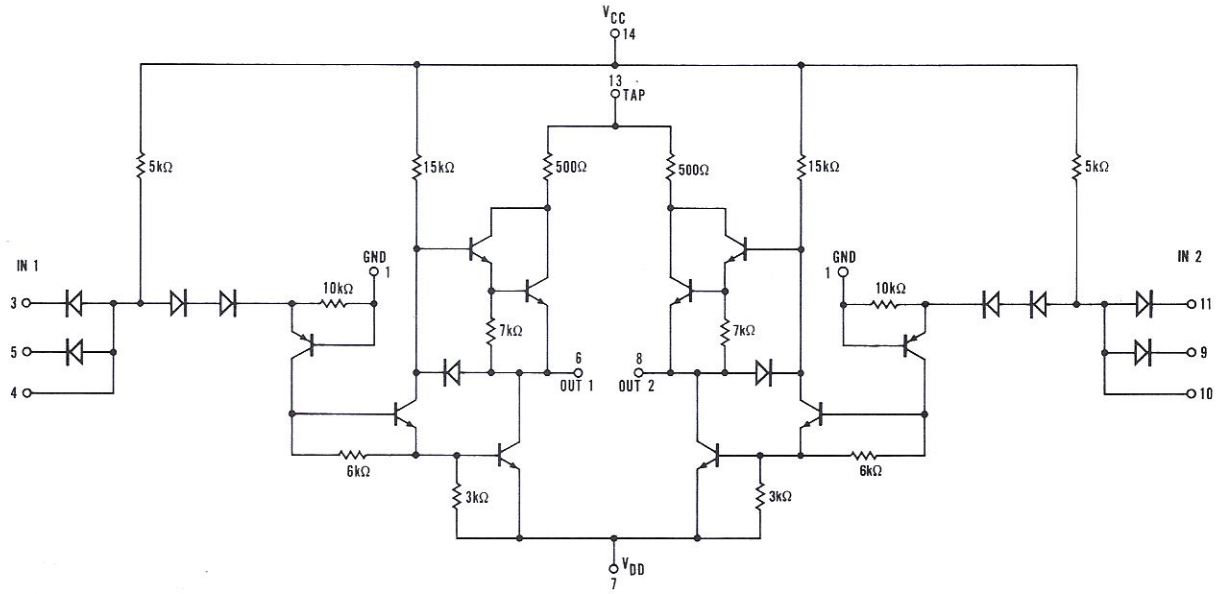


Fig. 1

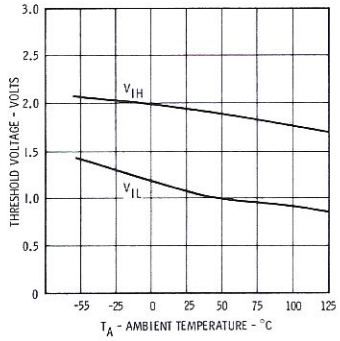
TABLE II —
ELECTRICAL CHARACTERISTICS ($T_A = 0°C$ to $+75°C$, $V_{CC} = 5.0\ V \pm 5\%$)

SYMBOL	CHARACTERISTICS	LIMITS 0°C MIN.	LIMITS 0°C MAX.	LIMITS +25°C MIN.	LIMITS +25°C TYP.	LIMITS +25°C MAX.	LIMITS +75°C MIN.	LIMITS +75°C MAX.	UNITS	CONDITIONS
V_{OH1}	Output High Voltage	−1.0		−1.0	−0.5		−1.0		Volts	$V_{CC} = 4.75\ V$, $V_{DD} = -28\ V$, $V_{TAP} = 0\ V$ $I_{OH} = -10\ \mu A$
V_{OH2}	Output High Voltage	+3.25		+3.25	+3.75		+3.25		Volts	$V_{CC} = 5.25\ V$, $V_{DD} = -20\ V$, $V_{TAP} = 5.25\ V$ $I_{OH} = -10\ \mu A$ Inputs at threshold voltages (V_{IL} or V_{IH})
V_{OL}	Output Low Voltage			See Note 1					Volts	$V_{CC} = 4.5\ V$, $I_{OL} = 10\ mA$, $V_{DD} = -11$ to $-28\ V$ @ $0 \le V_{TAP} \le V_{CC}$
V_{IH}	Input High Voltage	2.0		1.9			1.8		Volts	Guaranteed input high threshold for all inputs
V_{IL}	Input Low Voltage		1.2			1.1		0.95	Volts	Guaranteed input low threshold for all inputs
I_F	Input Load Current		−1.32			−1.25		−1.20	mA	$V_{CC} = 5.25\ V$, $V_F = 0.45\ V$
I_R	Input Leakage Current		5.0			5.0		10	μA	$V_{CC} = 5.25\ V$, $V_R = 4.5\ V$
I_{CEX}	Output Leakage Current					100			μA	$V_{CC} = 5.25\ V$, $V_{TAP} = 0\ V$ $V_{DD} = -28\ V$, $V_{OUT} = 0\ V$
I_{SC}	Output Short Circuit Current	−12	−31	−14		−32	−12	−31	mA	$V_{CC} = 4.75\ V$, $V_{TAP} = 0\ V$, $V_{IN} = 0\ V$ $V_{DD} = -11\ V$, $V_{OUT} = -11\ V$
I_{VCC}	V_{CC} Supply Current					6.1			mA	$V_{CC} = 5.25\ V$, $V_{DD} = -15\ V$, $V_{TAP} = 0\ V$ Input Open
I_{MAX}	Max. Current					10			mA	$V_{CC} = 10\ V$, $V_{DD} = -30\ V$, $V_{TAP} = 0\ V$ Input Open
t_{pd+}	Switching Speed				190	250			ns	$V_{CC} = 5.0\ V$, See Figure 2
t_{pd-}	Switching Speed				50	100			ns	$V_{DD} = -13\ V$, $V_{TAP} = 0\ V$

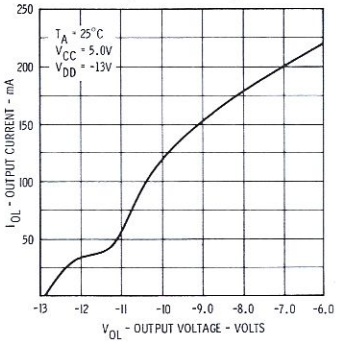
Note 1: Max = V_{DD} +1.0 V over Temperature Range
Typ = V_{DD} +0.2 V over Temperature Range

ELECTRICAL CHARACTERISTICS • 9624

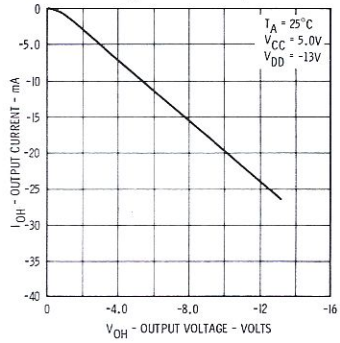
THRESHOLD VOLTAGE VERSUS AMBIENT TEMPERATURE



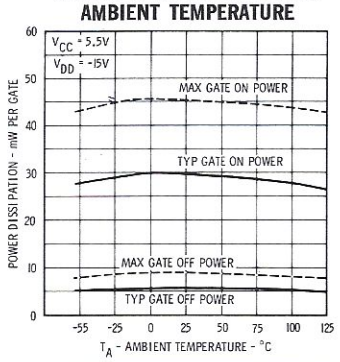
TYPICAL OUTPUT CURRENT VERSUS OUTPUT VOLTAGE (LOW STATE)



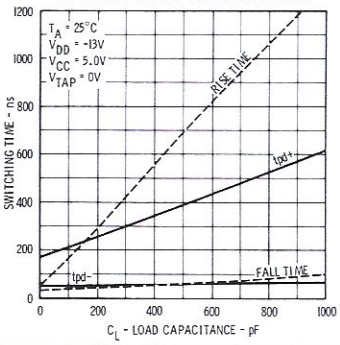
TYPICAL OUTPUT CURRENT VERSUS OUTPUT VOLTAGE (HIGH STATE)



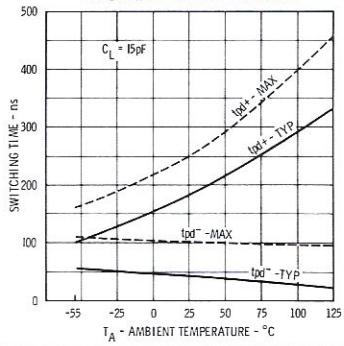
POWER DISSIPATION VERSUS AMBIENT TEMPERATURE



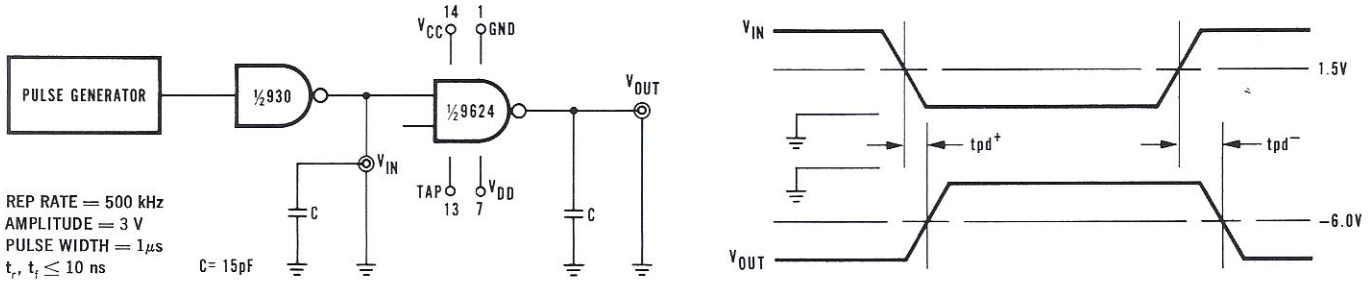
TYPICAL SWITCHING TIME VERSUS LOAD CAPACITANCE



SWITCHING TIME VERSUS AMBIENT TEMPERATURE



SWITCHING TIME TEST CIRCUIT AND WAVEFORMS
9624



TESTS	CONDITIONS			
	T_A (°C)	V_{CC} (Volts)	V_{DD} (Volts)	Tap Voltage
t_{pd}^+, t_{pd}^-	25	5.0	−13	0

Fig. 2

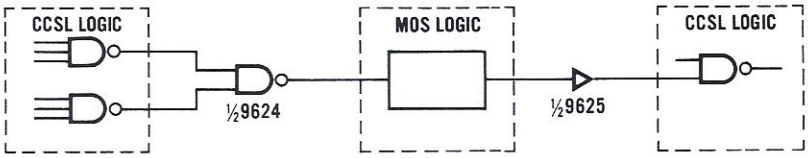
LOADING RULES:

*The extender pin allows the number of inputs to be extended by adding diodes or the DTμL 933 extender.

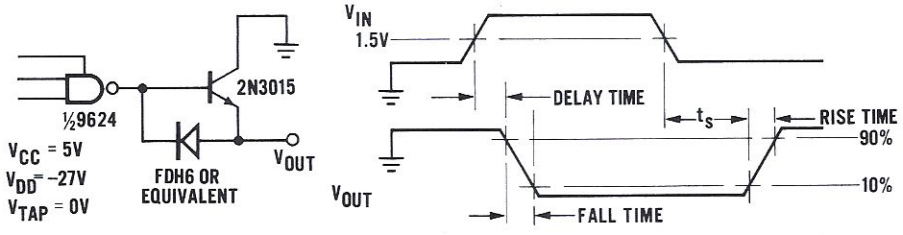
Note 1: Fan out into MOS is limited only by MOS leakage currents.

Note 2: $I_{IN} = +210\ \mu A$

APPLICATION:



CLOCK DRIVING (using a high capacitance drive scheme)



TYPICAL SWITCHING TIMES VERSUS LOAD CAPACITANCE

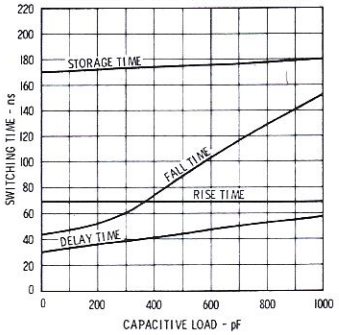


TABLE III —
ELECTRICAL CHARACTERISTICS ($T_A = -55°C$ to $+125°C$, $V_{CC} = 5.0\ V \pm 10\%$)

SYMBOL	CHARACTERISTICS	LIMITS						UNITS	CONDITIONS
		−55°C		+25°C			+125°C		
		MIN.	MAX.	MIN.	TYP.	MAX.	MIN. MAX.		
V_{OH}	Output High Voltage	2.5		2.6			2.5	Volts	$V_{CC} = 4.5\ V$, $I_{OH} = -60\ \mu A$ $V_{DD} = -11\ V$ Inputs at threshold voltages (V_{IH})
V_{OL}	Output Low Voltage		0.5			0.5	0.5	Volts	$V_{CC} = 5.5\ V$, $I_{OL} = 1.5\ mA$ $V_{CC} = 4.5\ V$, $I_{OL} = 1.2\ mA$ $V_{DD} = -11\ V$ Inputs at threshold voltages (V_{IL})
V_{IH}	Input High Voltage	−3.0				−3.0	−3.0	Volts	Guaranteed input high threshold for all inputs
V_{IL}	Input Low Voltage	−9.0		−9.0			−9.0	Volts	Guaranteed input low threshold for all inputs
I_F	Input Load Current		210			210	210	μA	$V_{CC} = 5.0\ V$, $V_F = -3.0\ V$, $V_{DD} = -13\ V$
I_{CEX}	Output Leakage Current					50		μA	$V_{CC} = V_{CEX} = 4.5\ V$, $V_{DD} = -13\ V$
I_{VCCL}	Supply Current					4.8		mA	$V_{CC} = 5.5\ V$, $V_{DD} = -15\ V$, $V_{IN} = -10\ V$
I_{VCCH}	Supply Current					2.1			$V_{CC} = 5.5\ V$, $V_{DD} = -15\ V$, $V_{IN} = 0\ V$
I_{VDD}	V_{DD} Supply Current					−9.0		mA	$V_{CC} = 5.5\ V$, $V_{DD} = -15\ V$ Input open or gnd
I_{MAX}	Max. V_{DD} Supply Current					−25		mA	$V_{CC} = 8.0\ V$, $V_{DD} = -20\ V$, $V_{IN} = 0\ V$
t_{pd+}	Switching Speed				55	100		ns	$V_{CC} = 5.0\ V$, $V_{DD} = -13\ V$ See Figure 4
t_{pd-}	Switching Speed				90	150		ns	

SCHEMATIC DIAGRAM

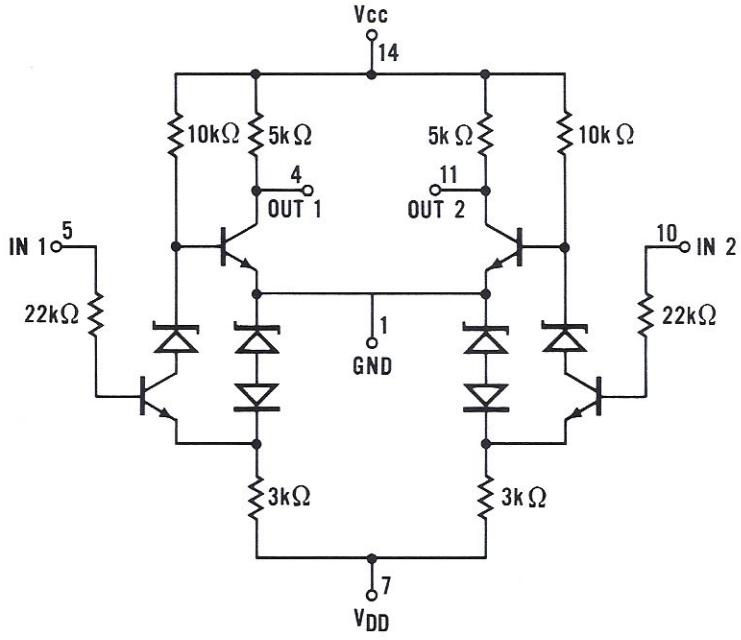
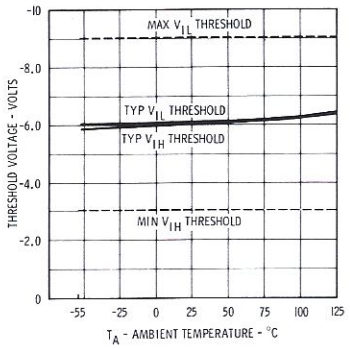


Fig. 3

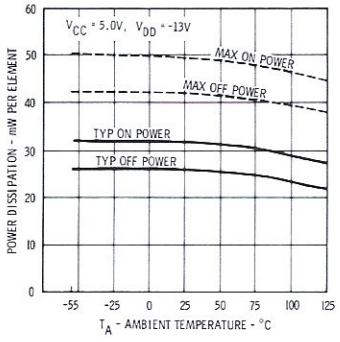
TABLE IV —
ELECTRICAL CHARACTERISTICS (T_A = 0°C to +75°C, V_{CC} = 5.0 V ±5%)

SYMBOL	CHARACTERISTICS	LIMITS 0°C MIN.	LIMITS 0°C MAX.	LIMITS +25°C MIN.	LIMITS +25°C TYP.	LIMITS +25°C MAX.	LIMITS +75°C MIN.	LIMITS +75°C MAX.	UNITS	CONDITIONS
V_{OH}	Output High Voltage	2.5		2.6			2.5		Volts	V_{CC} = 4.75 V, I_{OH} = −60 μA V_{DD} = −11 V Inputs at threshold voltages (V_{IH})
V_{OL}	Output Low Voltage		0.5			0.5		0.5	Volts	V_{CC} = 5.25 V, I_{OL} = 1.52 mA V_{CC} = 4.75 V, I_{OL} = 1.33 mA Inputs at threshold voltages (V_{IL})
V_{IH}	Input High Voltage	−3.0				−3.0	−3.0		Volts	Guaranteed input high threshold for all inputs
V_{IL}	Input Low Voltage	−9.0		−9.0			−9.0		Volts	Guaranteed input low threshold for all inputs
I_F	Input Load Current	210				210	210		μA	V_{CC} = 5.0 V, V_F = −3.0 V, V_{DD} = −13 V
I_{CEX}	Output Leakage Current					100			μA	V_{CC} = V_{CEX} = 4.75 V, V_{DD} = −13 V
I_{VCCL}	Supply Current					4.8			mA	V_{CC} = 5.25 V, V_{DD} = −15 V, V_{IN} = −10 V
I_{VCCH}	Supply Current					2.1			mA	V_{CC} = 5.25 V, V_{DD} = −15 V, V_{IN} = 0 V
I_{VDD}	V_{DD} Supply Current					−9.0			mA	V_{CC} = 5.5 V, V_{DD} = −15 V Input open or gnd
I_{MAX}	Max. V_{DD} Supply Current					−25			mA	V_{CC} = 8.0 V, V_{DD} = −20 V, V_{IN} = 0 V
t_{pd+}	Switching Speed				55	100			ns	V_{CC} = 5.0 V, V_{DD} = −13 V See Figure 4
t_{pd-}	Switching Speed				90	150			ns	

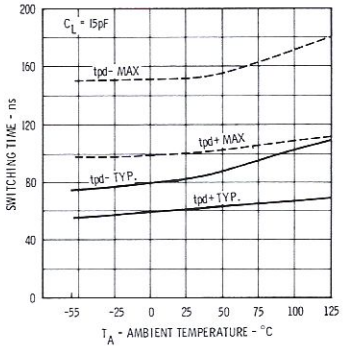
THRESHOLD VOLTAGE VERSUS AMBIENT TEMPERATURE



POWER DISSIPATION VERSUS AMBIENT TEMPERATURE

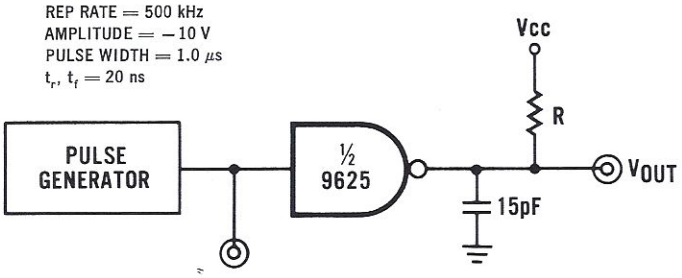


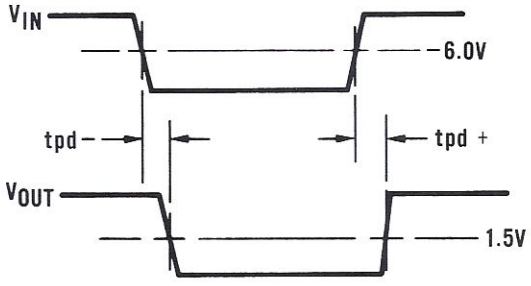
SWITCHING TIME VERSUS AMBIENT TEMPERATURE



SWITCHING TIME TEST CIRCUIT AND WAVEFORMS

REP RATE = 500 kHz
AMPLITUDE = −10 V
PULSE WIDTH = 1.0 μs
t_r, t_f = 20 ns





TESTS	CONDITIONS T_A (°C)	V_{CC} (Volts)	V_{DD} (Volts)	R (kΩ)
t_{pd}^+, t_{pd}^-	25	5.0	−13	3.75

Fig. 4

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